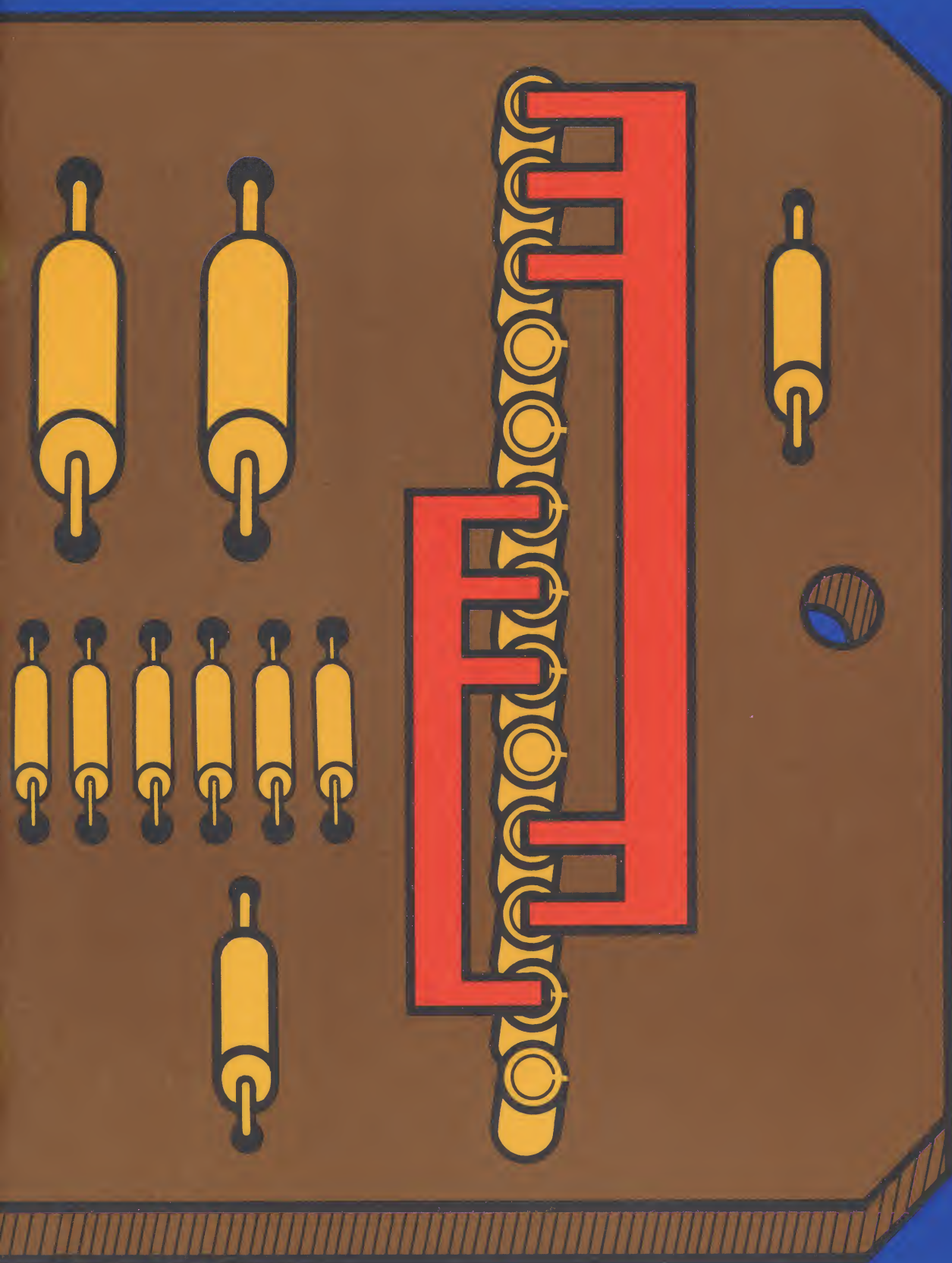


Digital Logic Circuit Cards



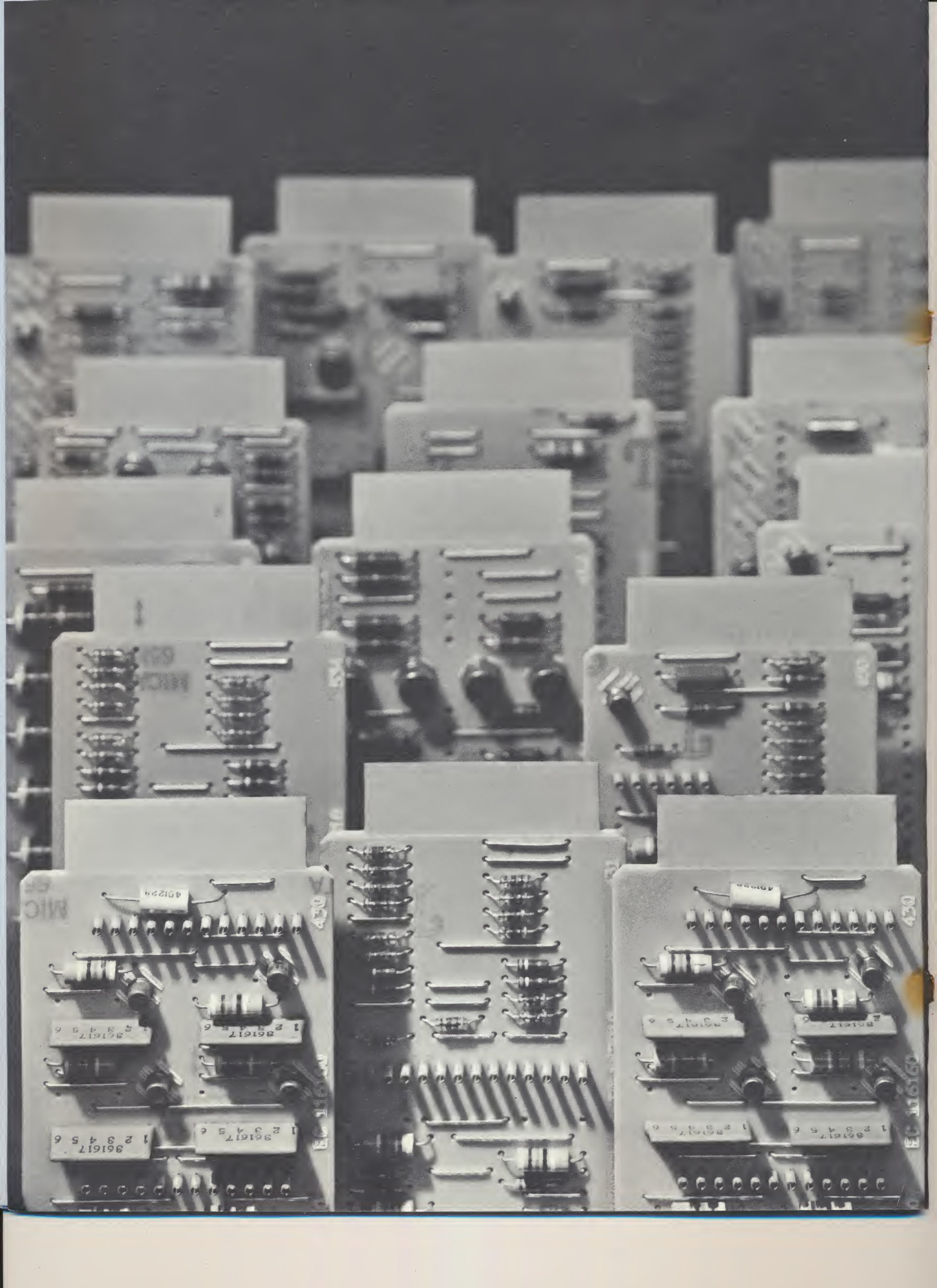
The illustration on the front cover highlights the programmable feature of IBM's digital logic circuit card family. This programmability allows a single card to perform the functions of many different circuit configurations.

Development of the Digital Logic Circuit Card Family

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Development of the Digital Logic Circuit Card Family

In 1965, IBM Industrial Products announced a new capability in total circuit packaging. This new capability grew out of IBM's own needs for greater flexibility and lower cost in packaging systems. IBM's modular circuit packaging system provides numerous packaging options and handles a wide variety of solid state and relay circuitry.

The IBM family of printed circuit cards is a logical extension of this total packaging capability. With a selection of relays, printed circuit cards and a flexible packaging system, IBM provides the electronics designer with the tools to breadboard his drawing board design easily and economically.

Five Programmable Cards

The IBM circuit card family comprises a complete line of printed cards for electronics logic functions. Five of the cards are programmable; that is, five cards of the family can easily be converted to perform the functions of many different circuit configurations. The designer can also program each card for high-speed or low-speed operations. And, optional load resistors can be programmed according to individual load requirements.

The remaining cards of the family are discrete logic cards including DC flip flops, flip flops with complementary emitter follower outputs, dual gated AC flip flops, crystal controlled oscillators, variable delays, variable single shots, and complementary emitter followers.

A unique marginal checking feature in many cards of the family allows the designer to identify critical timing conditions.

SDTDL Circuits

The IBM circuit card family is based on saturating drift transistor diode logic (SDTDL). This technique uses diodes to perform the logic function. Basically, transistors are used only to invert and amplify the logic output.

SDTDL circuits are classified as negative and-invert circuits or NAND circuits. All inputs at a nominal -6 volts yield a positive level out or zero volts ground reference. One or all inputs at a positive level or ground yield a nominal -6 volts at the output.

SDTDL circuits offer an additional advantage called the "DOT FUNCTION". The outputs of similar levels are tied together and share a common load. This condition provides an additional level of logic by creating NOR circuits out of the cards themselves.

Features

- High performance characteristics*
- Internal circuit flexibility*
- Logic card versatility*
- Simplified circuit design*
- Programmable for various loading conditions*
- High-speed/low-speed switching*
- Marginal checking*
- Proven operating characteristics*
- Simplified circuit modifications*

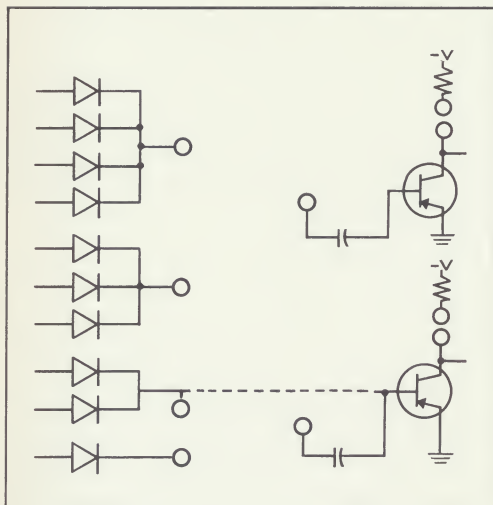


Figure 1. This is the programmable circuitry of logic card P/N 370955.

The Programmable Card

The programmable card is one of the unique advantages of the IBM circuit card family. For the designer it represents a versatile tool in logic design and breadboarding of prototypes. The kind of versatility that saves the cost of large in-process inventories. Versatility that simplifies design circuit modifications. The design engineer can use this family of cards to add or delete logic functions as needed simply by converting a programmable card.

The five programmable cards of the family can be converted to a variety of circuit configurations. This programmability allows the designer to build extra capability into his design now for future requirements. It allows him to change the speed of a logic function and meet many individual load conditions.

One of the five cards provides a NAND circuit. Three provide combinations of NAND/NOR circuits; and one is an INVERTER.

Program Caps And Pin Strips

In the illustration on the facing page, programmable card P/N 370955 is being converted to one of the many circuit configurations it can provide. A program cap pin strip, with the selected pin connections made, is being inserted into the program caps. Should the designer wish to convert this card to a different circuit configuration, he need only select the proper pin strip connection and insert it in the proper program caps.

The following is an example of the variety of configurations card number 370955 can be converted to:

Two 5-input NAND gates with or without loads at either high or low speeds.

One 10-input NAND gate with loads at either high or low speeds.

One 6-input and one 4-input NAND gate without loads at either high or low speeds.

One 8-input and one 2-input NAND gate with or without loads at low speed.

These are only a few of the possible ways of expanding a single IBM programmable logic card. More combinations can be derived depending upon the designer's requirements.

Documentation

The entire family of IBM digital logic circuit cards is fully documented. Basic data sheets provide the designer with the circuit diagrams, circuit symbolic representation and operational characteristics. Every card function is given a card code to identify its circuit; the programmable cards are coded for each configuration to which it can be converted.

IBM Engineering Specifications are available for each card of the family. These specifications provide the designer with all of the information necessary to effectively use the IBM card family, and to take advantage of the unique versatility of the five programmable cards.

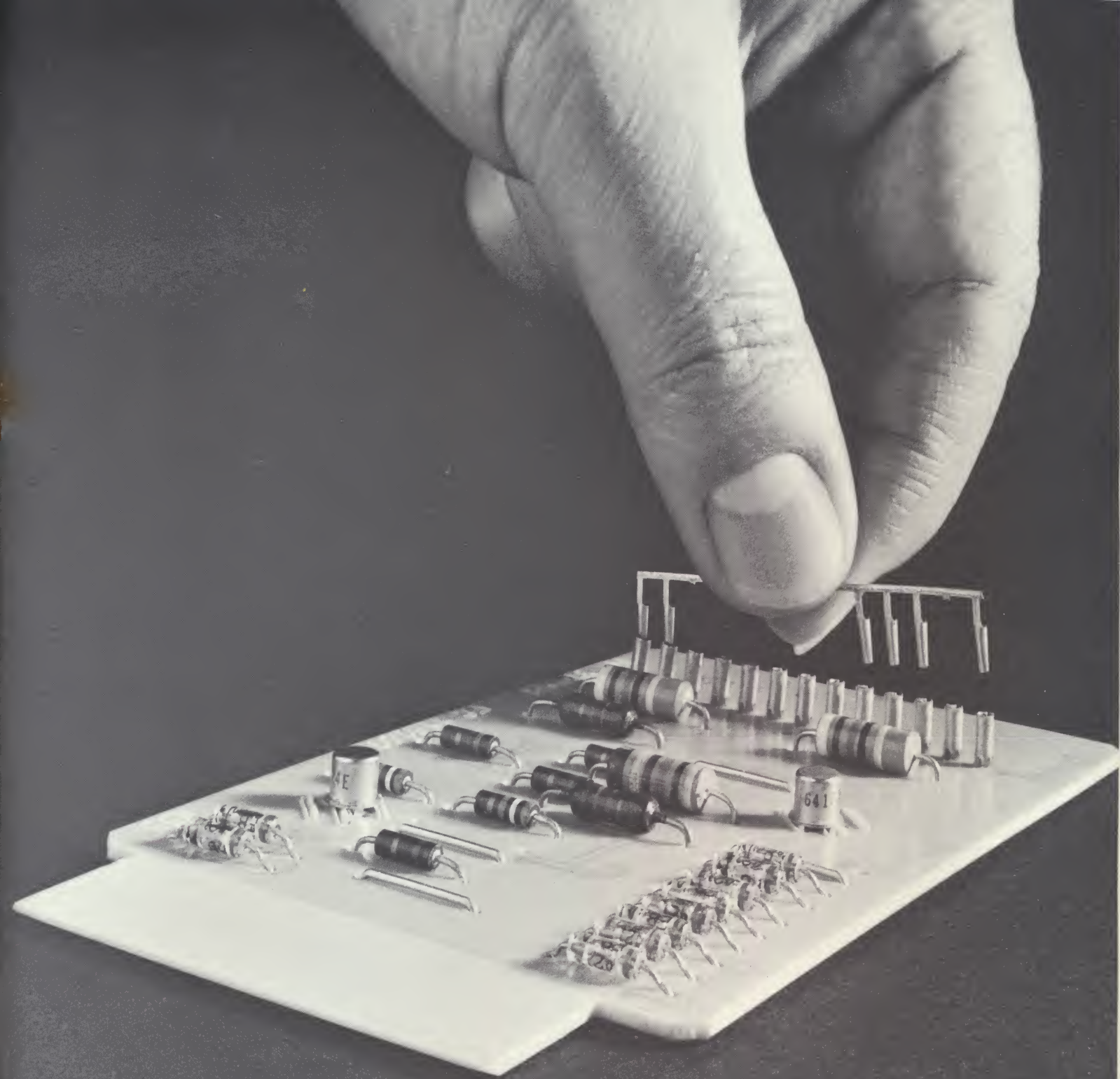
Engineering specifications include such information as equivalent circuits, noise sensitivity, available output currents, loading equations, transient response, rise and fall curves, turn-on and turn-off delays, voltage levels and application notes.

Programmable Circuitry

Figure 1 is a simple diagram of that portion of the circuitry which is programmable. The programmable circuitry of card number 370955 consists of two transistors, 10 diodes, two speed-up capacitors and pre-mounted collector loads. Each component or combination of components is terminated at a specific program cap at the top of the card. By the proper interconnection of the program cap pin strip this card can be converted to perform various logic functions.

The 10 diodes are in four groups: 4 diodes to a single cap, 3 diodes to a single cap, 2 diodes to a single cap and the last diode to a single cap. Each of the speed-up capacitors, transistors and resistors is connected to individual program caps. This comprises the programmable circuitry of the card. Other load resistors can be called in from separate cards. The combinations of this card are many and give the card the versatility to handle a number of logical functions.

This is logic card P/N 370955. The program cap pin strip is being inserted to change the card to one of its many circuit configurations.



IBM's low-cost card receptacles and inter-locking card guides simplify packaging problems. Ground planes, voltage chains, and back panel insulators simplify wiring. IBM's packaging system offers easy accessibility for servicing and diagnostic analysis.

Packaging Economy

IBM's packaging system offers new economy in total system packaging. For example, an 8-position card receptacle costs \$3.95; a 1-position card

receptacle costs \$.65. All card receptacles and circuit card contact tabs are gold-plated at the point of contact for high reliability and lowest resistance.

Two chassis frames are available: module I and module II. Module I provides 156 card positions in 6 rows, with 8 rows for wire contact or permissive-make relays used separately or intermixed.

Module II provides more card positions. Printed circuit cards are mounted in 10 rows, each row containing 28 card positions.

The Module I chassis frame is shown in Figures 2 and 3, complete with circuit cards, relays and associated circuit hardware.

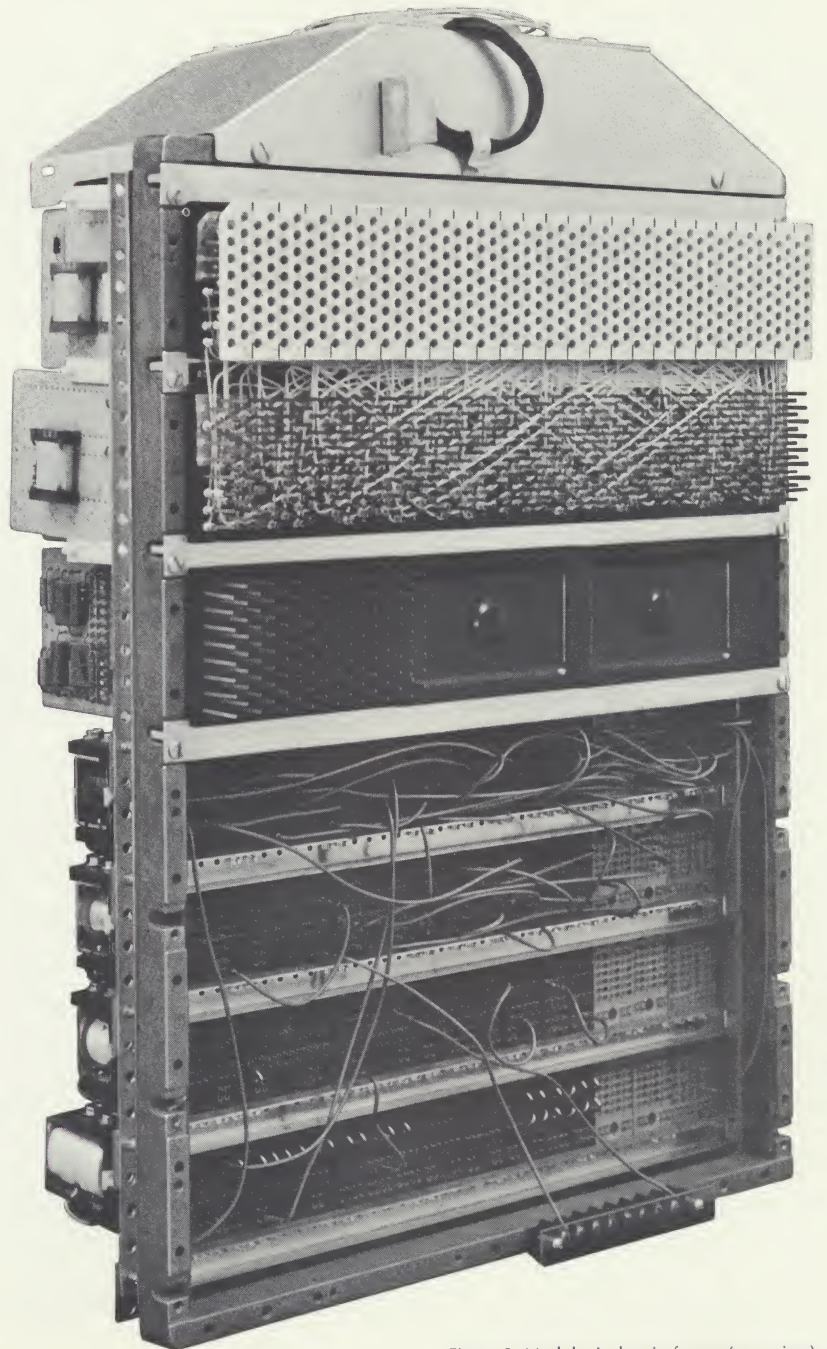


Figure 3. Module I chassis frame (rear view).



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